

BOTANICAL RESULTS FROM THE 1995 BISMARCK-RAMU EXPEDITION IN PAPUA NEW GUINEA

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ABSTRACT

Botanical results are presented from the 1995 biological survey of the Bismarck-Ramu tract, an area identified by multiagency assessment as a prime site for possible conservation action. The findings provide confirmation of the area's presumed biodiversity value. Over 610 distinct morphospecies and up to 15 confirmed or suspected plant novelties were documented by an intensive 24-day expedition. Three of the new species are formally described. General descriptions of the vegetation are also provided for the major floristic environments explored by the survey team. Adoption of special management and conservation measures is recommended for the subject territory.

ABSTRACT (MELANESIAN TOK PISIN)

Wanpela wok bus painimaut bilong ol saveman bilong ol bus diwai, rop, na gras, ibin kamap long Bismak - Ramu territori long Okroba 2 igo 24, 1995. Ol saveman bilong bus ol i kaunim olsem moa long 610 ol kain kain diwai, rop, na gras i kamap long dispela hap. Na wok painimaut i kamapim olsem fiftinpela long ol diwai na gras i nupela kain olgeta. Dispela tupela ten na foa de wok i soim dispela ples Bismak - Ramu em i holim wanpela long ol kain ples bus we Papua New Guinea mas lukautim gut. Stori long dispela pepa i rok klia long olgeta samting mipela lukim long Bismak-Ramu bus.

INTRODUCTION

Papua New Guinea (PNG) is a well known center for biological endemism and diversification. It ranks among the world's most botanically diverse countries, with a species-level floristic content variously estimated as high as 15,000–20,000 (Johns 1993), 20,000+ (Womersley 1978), and to ca. 25,000 (Mathew 1995). As one of its principal missions, the Department of Environment and Conservation (DEC) is responsible for identifying specific areas of conservation value within PNG. Based on several DEC internal evaluations and the Conservation Needs Assessment Report (Beehler 1993), a 168,000 hectare tract between Mt. Wilhelm and the Ramu River was recently selected for potential designation as a conservation unit (Figs. 1–2). This poorly-known area of interest (AOI) was suspected of sequester-

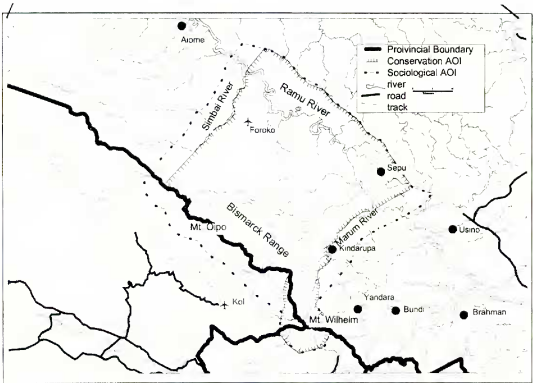
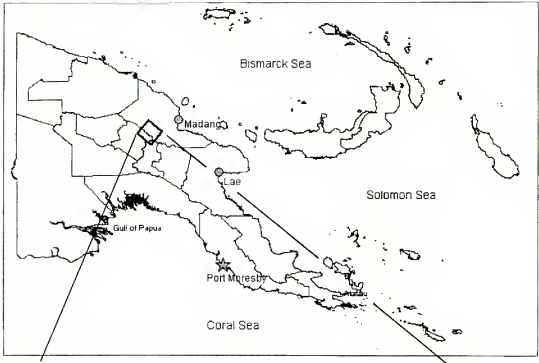


FIG. 1. Top. Papua New Guinea in aspect, showing the general location of the survey tract.
 FIG. 2. Bottom. Exploded view of the area of interest (AOI). Figures from Hedemark et al. (1997).

ing high biodiversity, and a survey was deemed necessary to secure more information on its suitability for further development as a protected zone.

During October 2–26, 1995, a biological survey was thus conducted from 4 base camps established between 600–2400 meters elevation inside the AOI (Fig. 3). Ten scientific participants from Papua New Guinea evaluated the botany, entomology, and vertebrate zoology of the area. Survey protocols were consistent with the ICAD (Integrated Conservation and Development) model. Although a comprehensive account of the expedition was published by Hedemark et al. (1997), only a cursory description of the vegetation was included since the botanical specimens had not been examined. Recently completed determinations, an amended site by site overview of the vegetation, synopsis of notable collections, and an improved species list (Appendix 1) can now be provided. A wide range of organizational, socio-cultural, and physical site information is presented in Hedemark et al. (*ibid.*, to which the reader is referred), and will not be repeated here.

METHODS

The botanical component of the survey consisted entirely of opportunistic general collecting, employing the 'Kostermans method' of field-packing duplicates in 70% surgical spirit for deferred processing. A complete set of the Bismarck-Ramu plant collections has been deposited at Lae National Herbarium (LAE). Principal recipients of duplicate sets are A, BRIT, K, and L; residual sheets are dispersed in no particular sequence and are likely to be at the institutions of family specialists.

In genera for which revisions are available, vouchers were keyed to species and the result confirmed against annotated sheets at LAE. For unrevised groups, exsiccatae were matched against authentically identified material and/or original descriptions. A number of specialists were also consulted; their identifications are provided with attribution on the attached species list (Appendix 1).

In the following account, taxa are referenced by the collection number on which the claim is based. The text has been expanded from Hedemark et al. (1997: 41–44) by addition of taxonomic detail resulting from the new determinations.

VEGETATION SUMMARIES

Camp 1

Location: Mt. Oipu, GPS 05° 35.5' × 144° 47.3', elevation 2360 m

Life zone: montane

Forest type: elfin or low stature mossy cloud forest

Collections sequence: 10381–10625

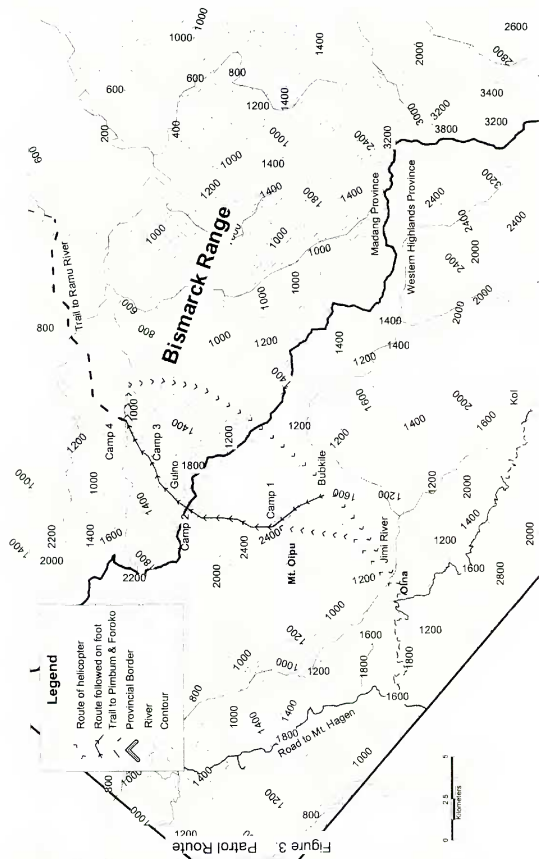


FIG 3. Trip route of the expedition. Reproduced from Hedemark et al. (1997).

At 2360 m, the expedition's highest camp was established in mossy ridgeline forest exposed to severe wind shear and constant misting. The vegetation at this site was generally stunted, taxonomically depauperate, and structurally unstratified. Stocking densities tended to be comparatively high due to the small size of most trees, with boles and crowns exhibiting the scraggly form and poor development typical of cloud stands. Due to steep slopes and everwet conditions, plant communities reflected the influence of frequent landslips and exposure of new earth. Successional montane taxa were prominent components of the vegetation on unstable terrain. A *Saurauia* complex with *S. cf. capitulata* (10596), *S. ilicifolia* (10424), *S. cf. naumannii* (10539), and a possible *Saurauia* sp. nov. (10447, 10570), was characteristic of colonizing communities. *Trimenia papuana* (10393, 10402) and the family Theaceae; including *Eurya cf. leptantha* (10394), *E. tigang* (10421, 10571), and *Ternstroemia britteniana* (10532, 10624), were also common in secondary growth. The regenerating facies was particularly striking and distinctive due to the towering inflorescences of *Harmsioplanax ingens* ssp. *ingens* (10514).

On the summit ridge beginning at ca. 2400 m, arborescent growth consisted of a stunted monolayer less than 4 m in height. The principal woody taxa were *Olearia rufa* (10598), *Prunus pullei* (10608), *Helicia microphylla* (10609), and *Ascarina philippinensis* (10613). *Acsmithia reticulata* (10603) was common in sheltered ravines off the crest.

On buttress ridges below the summit, the canopy layer was similarly reduced to dwarfed scrub. Phanerophytes typically included *Dillenia cf. schlechteri/quercifolia* (10495), *Elaeocarpus tariensis* (10422, 10591), *Garcinia archboldiana* (10494), *Planchonella monticola* (10589), *Podocarpus* sp. (10585, sterile), *Schuurmansia benningsii* (represented by two distinct architectural morphs: 10515 robust arborescent, and 10409 dwarfed form), *Weinmannia* sp. (all sightings sterile), and *Xanthomyrtus montivaga* (10602). Two *Pandanus* species; one monocaulous and planted, the other branched and naturally regenerating (§ Intraobtus, 10623), were conspicuous emergents on summits and steep slopes, the latter species being otherwise scarce on level ground. The understory was occupied by various infraspecific forms of the highly variable *Symplocos cochinchinensis* (e.g., 10415, 10566, 10614). *Schefflera* shrubs from the '*S. schumanniana* group' were also common, with representatives including *S. schumanniana* s. str. (10643, 10744), and allied forms such as *S. aff. sparsidentata* (10427, 10471). Lianes were relatively rare and inconspicuous.

Canopy statures increased progressively on the path descending towards Bubkile and lower slopes. However by elevation 2075 m, forest was replaced by grassland composed of weed and waif species characteristic of anthropogenic disturbance. *Eurya tigang* (10571), *Parasponia rigida* (10567), *Polyscias*

belensis (10580), and *Rhodomyrtus novoguineensis* (10568), formed a seral border between forest and grassland.

From the standpoint of floristic richness, herbaceous plants collectively represented the most important elements in the summit forest. Orchids and ferns were undoubtedly the most speciose groups. The genus *Cyrtandra* had more morphospecies than any other dicot understory constituent. Urticaceae was especially varied; *Elatostema blechnoides* (10450, 10478), *E. mongiense* (10535), *E. morobense* (10433), and *E. tridens* (10475) being particularly common. *Debregeasia* was also frequent, but the genus is unrevised and there are no available binomials for the Papuan species.

Two new taxa were discovered on Mt. Oipu, including a *Pilea* sp. nov. (10481; also 10559, 10740 from Camp 2), and *Prunus* sp. nov. (10588).

While the community composition was unarguably that of a well-preserved native forest, several cosmopolitan weeds have encroached along established trails on ridgelines and buttress crests. Although adventive species are often ignored in biological estimates of site value, such plants are convenient indicators of the proximity and intensity of human activity. At elevations above 2200 m, alien species were limited to *Bidens pilosa* var. *minor* (10458), *Ageratum conyzoides* (10429), and an unidentified subshrub (10425, 10431) cultivated as a village ornamental. The introduced elements are benign herbs and not community-invasive taxa like *Piper aduncum* of disturbed lowland environments. A planted *Pandanus* (aff. *?julianettii*) was seen only as scattered individuals along footpaths, but is otherwise naturally-occurring in the Highlands region.

On Hammermaster and Saunder's (1995) system of vegetation classification, the Mt. Oipu communities are assigned to structural code 'L,' applied to lower montane forests (above 1000 m) having dense, small-crowned canopies. Such forests change progressively in composition and stature according to elevation, eventually grading into the high montane formations (loc. cit.: 14). The expedition's ground survey indicates that the Mt. Oipu summit is structurally and taxonomically very close to subtype code 'Ls,' referring to very small-crowned forest where emergents (except *Pandanus*) are generally absent.

The Mt. Oipu vegetation would also be regarded as a 'lower montane rain forest' on the system of Grubb and Stevens (1985). However the apparent equivalence hides significant distinctions in the way the term is applied by the different authors. The Hammermaster and Saunders classification is derived primarily from stand-level characters determined from aerial survey, with the objective of identifying merchantable forest. Grubb and Stevens employ higher-resolution criteria applicable only by ground inspection (e.g., incidence of buttresses, woody climbers, cauliflory, drip tips, etc.) and is purely phytocological in orientation. Irrespective of the distinctions, Mt.

Oipu is clearly a lower montane rain forest sensu Grubb and Stevens, and of the 'mixed forest' type with no single dominant component.

Camp 2

Location: Mt. Gulno, GPS 05° 32.7' × 144° 47.8', elevation 2045 m

Life zone: montane

Forest type: medium stature mossy cloud forest

Collections sequence: 10647–10768; 10626–10646 from transit between camps 1 to 2

On Mt. Gulno, the canopy was similar to that from the first site. Many taxa were present at both camps, though apparently differing in their frequencies. Because of logistical concerns, collections were generally not repeated between camps for plants thought to be conspecific.

Kania eugenioides (10648) was a dominant tree species around Camp 2. Other common trees included *Actinodaphne tomentosa* (10752), *Ascarina subsessilis* (10760), *Caldcluvia rufa* (10673), *Cryptocarya notbofagetorum* (10652, 10680, 10728), and *Sloanea brachystyla* (10747). The most frequent shrubs were *Acronychia ledermannii* (10717, 10750), *Dysoxylum enantiophyllum* (10751), *Fittingia* sp. (10661, 10745), *Myrsine leucantha* (10573, 10671), *Pittosporum sinuata* var. *tenuivalve* (10655, 10689), *Stegantbera* cf. *insculpta* (10672), and *S. ilicifolia* (10749). Woody genera previously dominant on Mt. Oipu (*Weinmannia*, *Dillenia*, *Garcinia*, etc.), became less common at the second site. In general, phanerophyte taxa seemed more similarly abundant, though this was difficult to assess properly due to difficulties in making collections. Expedition climbers were rendered ineffective by rain, heavy misting, and thick bryophyte growth on tree trunks. Since the camp site was less exposed to wind, canopies generally exceeded 10 m, also making vouchers comparatively more difficult to secure.

As for camp 1, understory and epiphytic plants were very diverse, with ferns and herbs accounting for the majority of collections. Ericaceae was well-represented by *Diphycosia morobeensis* (10658), *Rhododendron anagalliflorum* s. str. (10686), *R. beyerinckiauum* (10685), and *R. urighianum* var. *insulare* (10656). The most notable find was a new species of *Bulbophyllum* (10724; det. N.H.S. Howcroft).

During the hike between camps 1 and 2, tall stature forest was encountered along the descent to the Kanel River and on the corresponding climb up opposing slopes to Mt. Gulno. A sharp structural break was evident at elevation 5700 feet aneroid (1740 m), with marked changes in epiphyte abundance, forest stature, and tree architectural form. This elevational level probably marks the lower limit of the cloud zone. The abruptness of physiognomic transition suggests that the cloud line is spatially fixed, at least locally.

The Mt. Gulno vegetation is assignable to the same forest classification units as discussed for Mt. Oipu.

Camp 3

Location: Wara Kanel (Kanel River), GPS 05° 31.8' × 144° 49.1', elevation 1545 m

Life zone: premontane

Forest type: tall stature ecotone forest with intermixed lowland and montane taxa

Collections sequence: 10769–10964

Camp 3 was sited in secondary vegetation extending along the Kanel riverbed and over adjacent slopes. *Saurauia* and *Cyathea* were the most conspicuous members of this riverine formation. In the former genus, the major species included *Saurauia* aff. *conferta* (10815), *S. congestiflora* (10826), *S. cf. naumannii* (10904), *S. schumanniana* (10940), and an unusual subglabrous species (10829, not *S. plurilocularis*). *Cyathea angiensis* (10848) and *C. weneri* (10794) were common tree ferns in heliophytic situations, while *C. bornei* (10846) was frequent in advanced regrowth. *Gastonia spectabilis* (10956) was a massive emergent. Other plants indicative of disturbance were repeatedly encountered throughout the area, their dominance the result of subsistence agriculture by Gulno villagers. Euphorbiaceae and Piperaceae were prominent in the successional vegetation, being represented by *Euphorbia plumerioides* var. *acuminata* (10792), *Homalanthus novo-guineensis* (10957), *Mallotus papuanus* (10947), *Piper lessertianum* (10874B, 10927), *P. radatzii* (10773), and *P. subbullatum* (10822). In mid-seral phases, *Alphitonia excelsa* sensu Schirarend (no coll.), *Melicope* spp. (10823, 10892), *Geunsia pentandra* (10821), and *Trema cannabina* (10918) became frequent, often forming dense stands. This regrowth association is found throughout northeastern PNG whenever human or natural agencies permit establishment of seral taxa. Phytogeographically, the weedy plants often range over the whole of Papuaia and also into the larger Malasian region. Several alien species were noted, mainly ephemerals such as *Crassocephalum crepidioides* (10799) and *Erechtites valerianifolia* (10797).

Away from the river, the primary forest canopy was diverse and more difficult to characterize. *Podocarpus* (10952, sterile) and *Calophyllum* (populations sterile) were common trees in a premontane assemblage also composed of Cunoniaceae, Elaeocarpaceae, Ericaceae, Lauraceae, Myrsinaceae, and Winteraceae. Intermixing with montane taxa were lowland representatives from Moraceae (principally *Ficus*) and Meliaceae (*Aglaia*). Urticaceae, Zingiberaceae, and various small ferns dominated the understory layer. Among the more abundant gingers were *Alpinia weneri* (10869), *Alpinia* sp. § *Dieramalpinia* (10964), *Etilingera* sp. (10878), *Pleurantiodium* sp. § *Psychanthus*

(10849, 10959), and *Tapeinochilos* (populations sterile). Common urticates included *Elatostema beccarii* (10894), *E. aff. belense* (10891), *E. novo-guineense* (10885, 10896), *Poikilospermum inaequale* (10858), and *Procris frutescens* (10901). In general however, the forest floor community was sparse and taxonomically depauperate. The most notable collections were possible new species in *Dendrobium* § *Grastidium* (10856; det. N.H.S. Howcroft) and *Myrsine aff. acrostica* (10958; det. J. Pipoly).

Unlike the montane camps, epiphytic loads were minimal and tree boles typically lacked mossy growth. Canopy species tended to be represented by trees with massive stems branching high above the ground (>20 m). There appeared to be sizable populations of merchantable *Elaeocarpus* and *Syzygium*, but this could not be confirmed by fertile gatherings. In contrast to the situation at the montane sites, virtually all the arborescent taxa in the mature growth forest were seen only in sterile condition. The few fertile individuals were often too high in the overstory for collection, the only exceptions being *Ceratopetalum succirubrum* (10853), *Flindersia pimenteliana* (10944), and *Lithocarpus cf. celebicus* (10785). According to local respondents, the forest trees begin flowering in November or December after the start of the rainy season, a claim consistent with climatic data reviewed in Hedemark et al. (1997).

The Kanal River forest is regarded as lower montane by Hammermaster and Saunders (1995), but differs from the previous sites in the appearance of lowland elements. Genera recorded from camp 3 which are characteristic of the lowland zone include *Caryota* (sightings), *Aceratium* (10806), *Leea* (10825), *Pometia* (sightings), and *Poikilospermum* (10858). Lowland rain forest can ascend to 1500 m (van Royen 1964), and the floristic composition of the Kanal locality is transitional to such forests. Unlike high elevation formations, the lowland-montane ecotone exemplified by the Kanal site has not received critical attention in Papuaia (Grubb & Stevens 1985). Future surveys in the Bismarck-Ramu tract could profitably focus on the transition, especially as unpublished findings from recent RAP (Rapid Assessment Protocol) surveys suggest that floristic richness in Papuaia peaks at or near this elevational level (e.g., Beehler 1997; Kulang et al. 1997).

Camp 4

Location: Wara Ikil (Ikil River), GPS 05° 30.8' × 144° 50.6', elevation 600 m

Life zone: lowland

Forest type: tall stature alluvial and foothill forest

Collections sequence: 10969–11110; 10965–10968 from transit between camps 3 to 4

Flanked by steeply ascending ridges, camp 4 was the most isolated expedition site and the least affected by disturbance. However on riverine flats, the vegetation was still subject to natural upsets and marked by the development of *Pometia* dominant canopy. Such communities are very typical of lowland environments throughout northern PNG. In addition to *Pometia pinnata*, the woody taxa on alluvial ground usually included *Bridelia penangiana* var. *penangiana* (11020), *Callicarpa longifolia* (10973), *Chisocheton lasiocarpus* (11000), *Dolicholobium oxylobum* (11042), *Endospermum labios* (11048), *Leucosyke capitellata* (11044), *Mussaenda scratchleyi* (11097), *Pipturus argenteus* (10990), *Prunus dolichobotrys* (11037), *Saurauia* aff. *conferta* (11036), and Anacardiaceae. The latter was represented primarily by sterile *Buchanania*, *Campnosperma brevipetiolata*, and *Senecarpus*. Subarborescent *Ficus* was represented by large populations of *F. arbuscula* (11038) and *F. comitis* (11100). The most common herbaceous plants were *Derris cuneifolia* (11031), *Desmodium sequax* (11023), *Pueraria pulcherrima* (11029), and *Stachytarpheta cayennensis* (11028). Urticaceae was also common, with many sightings of *Boeberia platyphylla* (11016), *Cypholophus nummularis* (11018), *Elatostema novo-guineense* (11022), *E. weinlandii* (11096), *Laportea decumana* (10974), and *Poikilogyne macrophylla* (11095).

The slopes and ridges above Wara Ikil have taxa less common than those along the river and represent a more diverse forest. Proper botanical assessment of such communities requires considerably more time and effort than is possible with brief surveys such as ours. From general impression, the stands near Camp 4 could be the richest plant community encountered by the expedition. Both the Kanal and Ikil foothills would no doubt repay further efforts at exploration.

Notable collections were *Antidesma katikii* (11054, 11079), formerly known only from a type collected in the Ramu area, *Garcinia* sp. nov. (11098, det. P.F. Stevens), *Psychotria* sp. nov. (11090), and *Syzygium* sp. nov. (11068).

The Kanal River vegetation is assigned to type code 'Hm' on Hammermaster and Saunders (1995), a category consisting of medium crowned forests on uplands below 1000 m. The camp 4 area has the most merchantable timber seen during the survey and represents the forest type of greatest interest to commercial operators.

NEW SPECIES, DISTRIBUTIONAL RECORDS, OR OTHER NOTEWORTHY COLLECTIONS

PTERIDOPHYTES

DENNSTAEDTIACEAE

Hypolepis scabristipes Brownsey; coll. 10778. Apparently a rare fern, represented by few collections in the Malesian region (Brownsey 1987).

Hypolepis scabristipes is a distinctive species, with yellowish-brown stipules marked by darker excrescences from the dilated hair bases (loc. cit.).

THELYPTERIDACEAE

Sphaerostephanos sp. ?nov.; colls. 10707 and 10733. The genus is one of the most speciose in Malesia (Holtum 1981) and includes numerous localized endemics. Our expedition numbers are sessile-glandular on both lamina surfaces, lack indusia, and have laxly setose sporangia. Sori are multiseriate and sometimes confluent. The collections are closest to *S. adenostegius* and *S. warburgii*.

MONOCOTS

ORCHIDACEAE

Bulbophyllum sp. nov.; coll. 10724

Dendrobium sp., § *Grastidium*; possible sp. nov.; coll. 10856. About 45 orchid species were collected during the survey, from which orchidologist N.H.S. Howcroft has determined two numbers as representing new species.

ZINGIBERACEAE

Alpinia sp. aff. *odontonema*, § *Pycnanthus*; coll. 10595. This differs from *A. odontonema* s. str. in its sessile leaves with raised nervation on upper surfaces. The expedition's collection conforms to material cited by R.M. Smith (1978) as an undescribed species.

DICOTS

ARALIACEAE

Polyscias belensis Philipson; coll. 10580. An uncommon montane tree, previously known from Bele River in West Irian and from Morobe Province (Philipson 1979). Lae Herbarium has only one sheet of this taxon. Apparently a first record for the Highlands Provinces.

Resembles a *Gastonia* but the pedicels are distally articulated. The voucher agrees in detail with the single sheet annotated by Philipson at LAE.

Schefflera aff. *sparsidentata* Frodin; colls. 10427, 10471. A possible novelty in the *S. 'schumanniana-schraderiana'* complex from which a number of new species have been described by Frodin (1982).

Closest to *Schefflera sparsidentata* but differing in the more robust inflorescence with extended rachis, glabrescent axes, and much longer pedunculate umbellules. The flowers are distinctly pedicellate rather than sessile. The conspicuous peduncular and floral bracts are densely clothed with setiform innovations on margins and/or surfaces.

CLUSIACEAE/GUTTIFERAE

Garcinia sp. nov.; coll. 11098. A *Garcinia* with cordate-based leaves has been preliminarily determined by P.F. Stevens as a novelty (pers. comm.).

The new species was seen as a single 10 m tree growing on the ridgeline above camp 4. Its leaves are sessile, decussate, firm-coriaceous, and abaxially

glandular-lineate. It is vegetatively distinguishable from other species by the subovate blade, typically 11.5×7 cm, with reflexed margins and amplexicaulous cordate base. The flowers are deployed in numerous axillary or infrafoliar fascicles, seemingly bisexual but probably functionally unisexual and with the plants dioecious.

ERICACEAE

Rhododendron anagalliflorum Sleumer; colls. 10389, 10686. As delimited by Craven (1980), *R. anagalliflorum* is an uncommon species confined to the Carstentz Mts. and the Bismarck-Wahgi-Jimi Divide. It has the reduced leaves characteristic of Series Linnaeoidea.

The expedition vouchers were procumbent or decumbent epiphytes. Corollas were campanulate, chartaceous, white or pink, with erect lobes and outer surfaces exclusively lepidote. The ovary is densely clothed with patent hairs but also provided with a lesser indumentum of coarsely tuberculate scales. Styles did not exceed the ovary and were mostly glabrous.

EUPHORBIACEAE

Glochidion sp. nov.; coll. 11543. The collection was from a subarborescent species seen in cloudy montane forest. It does not key out on Airy Shaw (1980). In appearance most like *Glochidion frodinii* and *G. involucare*, but separable on the following combination of characters:

Vegetative parts hispidulous. Inflorescence axillary or internodal; pistillate flowers often solitary. Capsules globose, 1.5 cm diameter, sessile, glabrous, exocarp somewhat verrucose.

The capsules are eaten raw by Bubkile villagers, a practice not usually encountered for Papuanian *Glochidion*. The fruit is crunchy in consistency and has a rather pleasant aftertaste. Unfortunately, this resulted in the village laborers consuming all the gatherings as they were made, leaving only a unicate for the press.

Macaranga reiteriana Pax & Hoffman; colls. 10496, 10508. *Macaranga reiteriana* was formerly known only from Morobe Province, Gulf Province, and the Idenburg River (Whitmore 1980). Lae Herbarium has material from each of the areas cited in Whitmore (ibid) but no new occurrences have been added to the national collection since then.

The species is distinguished by the single elongate stipule, narrow leaves, and solitary fruits on bare peduncles. It is frequent in regrowth communities on Mt. Oipu. Recent work at Crater Mt. in Simbu (Chimbu) Province has also documented the presence of the species from that area (e.g., Takeuchi 12262, 12274). Although the expedition vouchers represent a distributional record for the Highlands region, the plant is almost certainly more common and widespread than herbarium specimens would indicate.

Mallotus papuanus (J.J. Sm.) Pax & Hoffman, or aff.; coll. 10947. The

species has paired leaves; each leaf pair consisting of a highly reduced, stipuliform lamina opposed to an unreduced caudate blade. An indumentum of fulvous hairs covers the apical parts and underleaves.

Mallotus papuanus was previously regarded as endemic to West Iryan (Airy Shaw 1980). The expedition collection is apparently a first record for Papua New Guinea. Although annotated specimens of *M. papuanus* have not been seen, the species' characteristics are sufficiently distinctive for a description-based identification.

EUPHORBIACEAE/STILAGINACEAE

Antidesma aff. *chalaranthum* Airy Shaw; coll. 10716 (fr). *Antidesma chalaranthum* is known with certainty only from the staminate type collection, obtained from Goroka subdistrict in the Eastern Highlands (Airy Shaw 1979). A second specimen (*Streimann & Kairo* NGF 27636), was referred to this species as an example of the female plant, though the assignment was explicitly provisional (loc. cit.). The expedition voucher is similar to NGF 27636; both numbers being subappressedly puberulent on twigs, inflorescence axes, and abaxial midveins. Fruits are also identically glabrous, 5 mm in diameter, and with lateral styles. However our Bismarck collection has drupes distinctly oblique, compressed, and lacking a thin-crustaceous pericarp; characters unlike the number cited by Airy Shaw. There are possibly two taxa hidden in the *chalaranthum* facies.

Antidesma katikii Airy Shaw; colls. 11054, 11079. Supposedly a rare endemic, previously known only from the type specimen (*Coode & Katik* NGF 32762) originating near the Ramu River at 90 m elevation. The large linear-lanceolate leaves with pubescent midrib readily identify the species (Airy Shaw 1973, 1980). Unlike the type, the expedition collections include flowering material, from which the following accessory description is provided:

Inflorescence from leaf-bearing or defoliate nodes, axillary, racemose, 2–6 cm long, rachis patently pubescent; bracts ovate, 0.5 mm long; pedicels to 1 mm, provided with indumentum like the rachis; perigone cotyliform, typically 1 mm × 0.5 mm, glabrescent or puberulous, margins minutely toothed, otherwise truncate; disc tomentulose; ovary asymmetric, 0.8 mm × 0.6 mm, pilosulous; styles excentric, 2–4, divergent or reflexed, 2-fid.

Antidesma katikii is locally common and a characteristic taxon in the Kanal drainage. The label on the type indicates that the species was very abundant in disturbed forest at the original collection site. It is likely that the plant is not as rare as the scarcity of specimens would suggest, but is simply undercollected and of limited range.

LAMIACEAE/LABIATAE

Basilicum sp.; coll. 10626. The collection is not *B. polystachyon*, the only *Basilicum* species recorded for Papuaasia (cf. Keng, 1978). It may represent a

new species or a distributional record. The plant's major characteristics are:

Suffrutescent and terrestrial. Leaves opposite, herbaceous, sub-bullate, adaxial surface dark green, abaxially purple. Inflorescence terminal only, racemiform, axes puberulent; verticillasters about 1.5 cm apart, short and sparingly branched; pedicels long. Calyx bilabiate, manifestly venose (also with intercostals), hairs subulate and septate; lower lip with 3 segments, midlobe furcate and biapiculate, lateral lobes much reduced, rounded or obtuse; upper lip wider, entire, shorter than the lower labium. Corolla blue to violet, bilabiate, tube contorted, shorter than the calyx; upper lip shallowly 4-fid; lower lip induplicate, entire, enlarged, enfolding the stamens; stamens didynamous, scarcely exerted, connate at the base, filaments glabrous but with some sort of median callosity, anthers discoid and centrifixed; stigma 2-fid.

MELASTOMATACEAE

Astronidium novoguineense Merrill & Perry; coll. 10762. The species was formerly reported only from West Iryan and is now newly recorded for Papua New Guinea.

Collection 10762 keys out to couplets 71–72 in Maxwell & Veldkamp (1990) and best matches *A. novoguineense*. However the shape of the calyx tube also suggests *A. fragilissimum*. If the specimen is actually the latter species, it would represent a first record for Mamose (i.e., northern PNG) region, since *A. fragilissimum* is currently known only from Central Province (loc. cit.).

Medinilla sp. nov.; coll. 10408. Keys to species 49–52 in Mansfeld (1925) but does not match the binomials there. The collection is somewhat like Merrill and Perry's '*mansfeldiana-markgrafii*' group except for the cernuous cauline inflorescence. Other salient characteristics are the following:

Epiphytic, erect, monocaulous or not. Stems and innovations setose. Leaves opposite, acroscopically directed, elliptic, to ca. 20 cm × 7.5 cm, glabrous except near the base of abaxial costae, 5–7 plinerved. Petioles proximally provided with large auriculiform alae, the auricles foliaceous, paired, purple, rounded but with margins erose. Inflorescence racemiform or sparingly ramifying, conspicuously and persistently bracteate.

MONIMIACEAE

Steghanthera insculpta Perkins; colls. 10513, 10672. *Steghanthera insculpta* is the only species in Philipson's (1986) conspectus with sessile female inflorescences. It was previously known from two collections in the Sepik region (ibid).

MYRSINACEAE

Myrsine aff. *acrostica* (Mez) Pipoly; coll. 10958. *Myrsine* is currently be-

ing reviewed by J. Pipoly, and Malesian taxa formerly included in *Rapanea* are being transferred to *Myrsine*.

Collection 10958 is either a new species or a very aberrant *Myrsine acrostica* (Pipoly, pers. comm.).

MYRTACEAE

Syzygium sp., aff. *megistophyllum* Merrill & Perry; coll. 11068. The collection keys out to *S. megistophyllum* in Hartley and Perry (1973). It differs from that species in the linear-elliptic leaves, to 36 cm × 8.5 cm in size, with base subsessile-emarginate but not deeply cordate. The lateral veins are in 25–30 pairs, generally straight, and obliquely diverging to a commissural nerve 2 mm from the leaf margin.

Syzygium megistophyllum is apparently known only from a fruiting specimen obtained in West Iryan (loc. cit.). The inflorescence on 11068 was cauline, developing as abbreviate cymes ≤ 4 cm length at the base of a short stem. This is not too different from the description for *S. megistophyllum*, though the foliar characters are otherwise distinct. The expedition voucher probably represents a new species.

PIPERACEAE

Piper lessertianum (Miq.) C. DC.; colls. 10874B and 10927. The species is a laxly pubescent climber with auriculate leaves. It is infrequently collected and apparently uncommon; Lae Herbarium has only two sheets of this taxon.

ROSACEAE

Prunus gideonii Takeuchi, sp. nov. (Fig. 4). **TYPUS:** PAPUA NEW GUINEA.

WESTERN HIGHLANDS PROVINCE: Bismarck Range, Mt. Oipu, ridge between 'Camp 1' and Bubkile, GPS lat. 05° 35.513' S, × long. 144° 47.252' E, elevation 2357 m, 07 Oct 1995 (fr), W. Takeuchi 10588 (HOLOTYPE: LAE; ISOTYPE: L).

A. P. pulleo laminis lanceolatis (non ellipticis vel oblongis) 15 cm longioribus (nec minoribus), atque glandularibus basalaribus obsoletis (non praeditis), denique habito monoaxiali (non polyaxiali) facile dignoscenda.

Understorey shrub, monocaulous or hardly branched at the top; provided with fulvous to orange-brown indumentum on all vegetative parts. *Stem* ascending, weak, virgate, 2–3 m long, woody throughout. *Branchlets* few or none, if present short and obliquely ascending, tomentose. *Stipules* conspicuous, paired at the petiole base, free, lanate, persisting, acuminate, 12–20 mm × 5–10 mm. *Leaves* spirally arranged, firm, manifestly bullate; mature blades lanceolate to oblong-lanceolate, 18–27 cm × 9–11 cm, apex acute, margin reflexed, base obtuse or subequally notched, often induplicated; adaxial surfaces dark green, initially pilose on veins, later glabrescent, abaxially orange-brown and lanate, opaquely punctulate; lateral veins 6–9 pairs, obliquely diverging, supramediately looping and usually closing at 2–4 mm from the

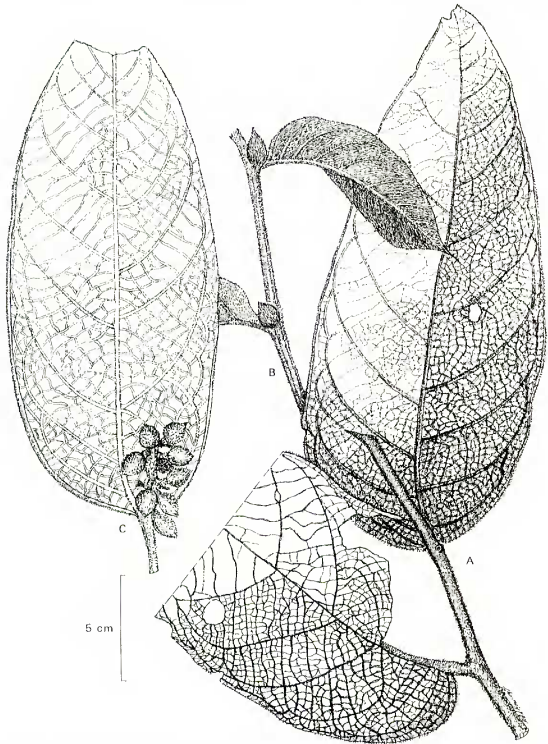


FIG. 4. *Prunus gideonii* Takeuchi, sp. nov. A: habit, mature leaves. B: shoot with stipules and immature leaves. C: infructescence.

margin, nervation deeply impressed above, on undersides very elevate, areolate and with blackened nerves; basal glands absent; petioles 12–15 mm long, entirely pubescent. *Inflorescence* not seen. *Infructescence* racemose, solitary, axillary from attached leaves, 4–8.5 cm long, rachis 3–4 mm thick, lanate; pedicels 4–12 mm long, densely pubescent. *Drupe* ovoid to subglobose, 12–13 mm × 9–10.5 mm, hypanthium residue 3–5 mm diam.; epicarp pinkish-red, appressedly hairy; style persisting, stigma capitate or somewhat discoid; endocarp glabrous. *Seed* single, abortive or immature, crispate; testa glabrous.

Distribution and ecology.—*Prunus gideonii* is known only from the type locality, in stunted montane forest within the cloud zone.

Etymology.—The new species is named for Dr. Osia Gideon, a specialist in Papuanian Rubiaceae and Costaceae, and currently the deputy director of the PNG Forest Research Institute.

Prunus gideonii has a distinctive aspect, with fulvous-lanate hairs on nearly all parts and large bullate leaves to 25 cm × 11 cm. Other diagnostic features are the sub-monocaulous habit and the conspicuous, persisting stipules.

The plant's sectional affinity is unclear because the type is apparently aglandular and lacks flowers. On the basis of phytogeography, *P. gideonii* probably belongs to subgenus *Laurocerasus* section *Mesopygeum* (cf. Kalkman 1965). The type keys out to *Prunus pullei* in Kalkman (1993) but is obviously not that species.

On Kalkman's (ibid: 322–26) key to fruiting specimens, the simplest way of accommodating the new binomial is by deleting *P. pullei* from fork 46 but retaining line 46b as the lead to the following couplet:

Ramiform trees or shrubs; leaves elliptic to oblong, 2–12 cm length, basal glands present	<i>Prunus pullei</i>
Monocaulous or sparingly branched shrubs; leaves lanceolate, >15 cm length, basal glands absent	<i>Prunus gideonii</i>

RUBIACEAE

***Psychotria howcroftii* Takeuchi, sp. nov. (Fig. 5). TYPUS: PAPUA NEW GUINEA.**

MADANG PROVINCE: Bismarck Range, ridge above 'Camp 4,' GPS lat. 05° 30.771' S, × long. 144° 50.646' E, elevation 900 m, 23 Oct 1995 (fl, fr), W. Takeuchi 11090 (HOLOTYPE: LAE; ISOTYPES: A, BISH, BRIT).

Propter inflorescentiam trichotomam, stipulas valvatas, tubum corollinum 2 mm longiorum, denique fructum magnum, *P. solomonensi* valde arcte affinis, sed ab ea laminis 22–30 (non 17–20) cm longis, nerviis secundariis 15 minoribus (nec majoribus), denique floribus pedicellatis (non sessilibus) statim distinguitur.

Fruticose or subarborescent to 4 m height, vegetative parts entirely glabrous. *Stem* erect and laxly branching, basal swell absent. *Branchlets* terete, 4–7 mm diam., pithy, fleshy, moderately robust, collapsing when dry, surfaces smooth and nitid. *Stipules* valvate, basally connate, ±fugacious, at first

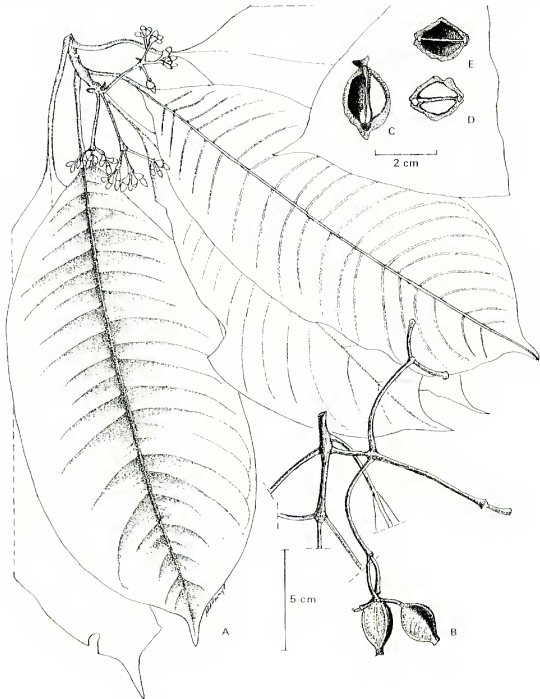


FIG. 5. *Psychotria boucroftii* Takeuchi, sp. nov. A: habit; mature leaves and young inflorescence. B: architectural form (ternate) of the infructescence. C: drupe in longisection. D and E: drupe in cross-section. Endosperm ruminations not shown.

acuminate and conduplicate, expanding and ovate when fully developed, 7–9 mm × 6 mm, undulate, margins entire. *Leaves* opposite, coriaceous, spreading, domatia lacking; mature lamina oblanceolate-oblong, 22–30 cm × 8–13 cm, apex abruptly acuminate, base cuneate; adaxial surfaces dark

green, abaxially very pale green, in sicco bifacially fuscous; lateral veins in 16–19 pairs, equispaced, evenly arcuate, closing only rarely by marginal loops, major veins embossed on upper side, prominulous beneath; reticulum feeble, the crossing nerves subscalariform, otherwise with plexus irregular; petioles 4–6 cm. *Inflorescence* terminal, to 5 cm length, umbelliform, 3 rachises connivent and approximately 'trichotomous', primary branches ternate-verticillate, ultimately cymose, all axial surfaces light green and glabrous; bracts caducous, deltoid, minute, reflexed, adaxially pilosulous. *Flowers* sessile and externally glabrous; calyx cupular-turbinate, 5–6 mm × 4–6 mm, margins strictly truncate; corolla 4-merous, valvate, white, the bud acute, 9 mm × 2.5 mm prior to anthesis, lobes oblong, divided to 3 mm from the base (rehydrated bud 12.5 mm × 4.5 mm with segments 7.5 mm × 3 mm and divided to 5 mm from the base); throat pilose, hairs separate-moniliform; stamens 4, alternipetalous, adnate near the sinuses; anthers dorsifixed, oblong; style exceeding the anthers, glabrous, ?heterostylous; stigma 2-fid and fimbriate; disc annulate, glabrous, marked by a central excavation after stylar abscission; open flowers not seen. *Infructescence* diffusely paniculiform-umbelliform, flaccid, to 10 cm length, articulated at the ramifications; peduncle 2 cm. Drupes subglobose-ellipsoid, 19–22 mm (excluding calyx) × 15–17 mm, pericarp orange-red, convex, contracting and conspicuously angulate after drying; calyx tube persisting at the summit, vasiform to cylindric, 3–4 mm × 4–6 mm. *Pyrenes* 2, equal, plane on the commissural face, dorsally crested; endosperm ruminant.

Distribution and ecology.—Known only from the type locality, there occurring as scattered individuals in the understory of mature growth forest or in stands with advanced regrowth.

Etymology.—The new species is named for N.H.S. Howcroft; an orchidologist, silviculturist, and botanical illustrator, currently serving as the managing consultant of a balsa project in New Britain.

Psychotria howcroftii is immediately distinguished by the exceptionally large fruits borne on a diffuse, articulated infructescence. The oversized drupes are made even more conspicuous by persistence of the 4 mm long calycine tube. Among Papuasian *Psychotria* only *P. monopedicellata* has fruits as large but that species has calyptrate stipules and monoaxial inflorescences (Sohmer 1988).

The immature inflorescence on *P. howcroftii* appears trichotomous (sensu Sohmer), but since the mature infructescence is pedunculate, the initial trichotomous structure is merely due to delayed prolongation of the peduncle. Another developmental peculiarity is that stipular form becomes manifest only at the subapical node, the stipules being otherwise severely enfolded at the apex.

The new species will key to fork 36 on Solmer (1988: 15). It can then be assimilated to the existing decision train by deleting lead 36b for *P. solomonensis* and adding the following:

36b. Corolla tube at least 2 mm long

Mature blades >20 cm long; lateral veins >15 pairs; fruits >15 mm long *P. howcroftii*

Mature blades <20 cm long; lateral veins <15 pairs; fruits smaller *P. solomonensis*

URTICACEAE

Pilea hedemarkii Takeuchi, sp. nov. TYPUS: PAPUA NEW GUINEA, BORDER OF WESTERN HIGHLANDS PROVINCE AND MADANG PROVINCE: Bismarck Range, near 'Camp 2' on Mt. Gulno, GPS lat. 05° 32.7' S, × long. 144° 47.8' E, elevation 2040 m, 12 Oct 1995 (fl, fr), W. Takeuchi 10740 (HOLOTYPE: LAE; ISOTYPES: K, L).

Species haec inter se aliis species generibus, laminis linearibusque uninerviis atque squamibus aurantiaco-lepidoribus indutis praecclare distat.

Weakly ascending monocauls or ramiform chamaephytes, <0.5 m height, terrestrial, monoecious. *Stems* slender, terete, glabrate, orange-brown, marked by parallel cystoliths or not. *Stipules* axillary, connate, caducous, obscure, 0.2–0.3 mm long, entire. *Leaves* paired, isomorphous but generally unequal, divergent, glabrous, chartaceous, bifacially squamulose; scales diffuse, peltately based, orange-hyaline with darkened centers; lamina linear, major blades usually 17–34 mm × 2–3 mm, apex acute, margins distally and distantly serrate, proximally entire, base obtuse; adaxial surfaces dark green, provided with linear cystoliths, these mostly transversal, less often randomly directed, on leaf margins abruptly longitudinal and congested; abaxial surfaces pale green to glaucous, collaterally glandular-lineate along the midrib; venation unicostate, other nervation invisible; petiole 1–3 mm long. *Inflorescence* axillary and solitary; cymes glomerulate, several together, occasionally simple; peduncle obsolete or to 9 mm long and filiform. *Male flowers* (rehydrated measurements) sessile or less commonly pedicellate, bracteolate, glabrous, entirely white; perigone 4-fid, typically 3 mm long, 1.5 mm wide at the base, ovoid in bud, segments lanceolate-ovate, each about 1.8 mm × 1.2 mm, costate, the rib excurrently corniculate or mucronulate; stamens 4, oppositi-tepalous, adnate to the tube, filaments inflexed; pistillode reduced to a minute flap. *Female flowers* glabrous, pedicelled or appearing sessile when immature; perigone 3-partite, fleshy, lateral segments vestigial, median segment enlarged and accrescent, acroscopic; staminodes 3, globular, oppositi-tepalous; ovary ellipsoid to cylindrical at first, later oblique and compressed; stigma penicillate, semi-persisting, directed at the major tepal. *Infructescence* entirely light green. *Fruits* basiscopic on a retrorsely turned stalk, asymmetrically ovoid, 1.2–1.0 mm × 1.0 mm, compressed, marginate; pericarp thin and smooth. *Seed* flattened, rostrate.

Distribution and ecology.—*Pilea hedemarkii* is known from montane forest

in the Western Highlands, Madang, and West Sepik Provinces. During the expedition it was often seen along footpaths and forest margins. Another collection which is referable to this species (NGF 41691), has a label describing its habitat as 'broken forest,' further showing that the plant is found in successional situations.

Etymology.—The new species is named for Michael Hedemark, the expedition leader and a former conservation biologist with the United Nations Development Program. He is currently with the Wildlife Conservation Society in Laos.

Other Specimens Examined: PAPUA NEW GUINEA. West Sepik Province: Bli Mt. south of Oksapmin, broken forest on hillside, lat. $05^{\circ} 20' S \times 142^{\circ} 15' E$, elevation 7200' (2195 m), 22 Oct 1968 (fl), *E. Henty, R. Isgar, & M. Galore*, NGF 41691 (A, BRI, CANB, K, L, LAE). Western Highlands Province: Bismarck Range, Mt. Oipu, subcrest slopes of main ridge in vicinity of 'Camp 1,' low stature montane forest in cloud zone, GPS lat. $05^{\circ} 35.5' S$, \times long. $144^{\circ} 47.3' E$, elevation 2360 m, 05 Oct 1995 (fl), *W. Takeuchi 10481* (A, BISH, BRIT, CANB, L, LAE); Bismarck Range, Mt. Oipu, ridge community between 'Camp 1' and Bubkile, low stature montane forest in cloud zone, GPS lat. $05^{\circ} 35.5' S$, \times long. $144^{\circ} 47.3' E$, elevation 2400 m, 07 Oct 1995 (fl), *W. Takeuchi 10559* (K, LAE).

Papuasian *Pilea* have been treated in Winkler (1922) and van Royen (1982). Although both authors provide keys to species the coverage of either account is incomplete. The genus still awaits a synthetical revision.

Pilea hedemarkii is distinguished from all other Papuasian congeners by the linear and uninerval leaves. The minute, orange-brown, and peltate scales are also distinctive, though not unique.

DISCUSSION

The expedition discovered about 15 confirmed or suspected new species, in addition to other noteworthy gatherings summarized in the preceding section. At least 613 distinct morphospecies were represented in the 730 collections made by the survey. It is instructive to compare the number of novelties reported here with two of the largest surveys recently concluded from other parts of Papuasias, both of which were also of approximately one month duration. The 1994 New Ireland survey produced only two new taxa (Takeuchi & Pipoly 1998), and a total of 8 novelties is suspected from the 1997 Lakekamu survey (Takeuchi & Kulang 1998). Results from the present expedition support previous estimates of high biodiversity in the Bismarck-Ramu tract, and justify enactment of conservation measures for the area. Due to inclement weather and the overall scarcity of fertile sightings, the collections coverage was far from comprehensive. There is clearly considerable scope for further discovery.

APPENDIX I

Expedition Plant List From Bismarck-Ramu. Numbers refer to exsiccatae vouchers. SR = sight record without exsiccatae; (m) = male plant; (f) = female plant. Determinations by the author unless otherwise indicated. Asterisk (*) preceding binomial indicates presence of discussion in text.

AVASCULAR PLANTS

BRYIDAE

genus inder., 10675, 11003

FERNS AND FERN ALLIES

ADIANTACEAE

Syngnema quinata (Hook.) Carruth., 11062

Taroneis blechnoides (Willd.) Swartz, 10937

ASPLENIACEAE

Asplenium acrobryum Christ, 10537, 10970, 11055

Asplenium affine Swartz, 10526

Asplenium bipinnatifidum Baker, SR from Camp 3

Asplenium caudatum Forst. f., 10777, 10910

Asplenium cuneatum Swartz, 11051

Asplenium decorum Kunze, 10837

Asplenium morobense Copel., 10643B

Asplenium nidus L., SR from Camp 3

Asplenium phyllitidis Don subsp. *malesicum* Holttum, 10893-A, 11050

Asplenium steerei Harrington, 10445, 10456

Asplenium cf. steerei Harrington, 10479

Asplenium submarginatum Rosenst., 10996

Asplenium tenerum Forst. f., SR from Camp 3

Asplenium unilaterale Lam., 11002

Didymochlaena truncatula (Swartz) J. Smith, 10924

ATHYRIACEAE

Diplazium bantamense Blume, 11064

Diplazium cordifolium Blume, 10761, 11056

Diplazium esculentum (Retz.) Swartz, 10781

Diplazium sp., 10779

BLECHNACEAE

Blechnum acutiusculum (v.A.v.R.) C. Chr., 10435

Blechnum cf. archboldii C. Chr., 10604

Blechnum dentatum (Kuhn) Diels, 10828, 11074

Blechnum denso-lobatum Brause, 10423

Blechnum fraseri (A. Cunn.) Luerssen, 10576

Blechnum orientale L., SR from Camps 1 & 3

Steuochlaena areolaris (Harr.) Copel., 10772

CHEIROPLEURIAEAE

Cheiropleuria bicuspis (Bl.) Presl, 10942

CYATHEACEAE

Cyathea angiensis (Gepp) Domin, 10848

Cyathea cf. cinnamata Brause, 10763

Cyathea geluensis Rosenst., 10551, 10561, 10706

Cyathea hornei (Baker) Copel., 10846

Cyathea perpelvigera v.A.v.R., 10635, 10697

Cyathea uverneri Rosenst., 10794

Dicksonia cf. sciurus C. Chr., 10765

DAVALLIACEAE

Davallia divaricata Blume, 10776

Humata sp., 'alpina-neoguineensis group', 10572

Humata sp., 11066

Lenostegia pallida (Mett.) Copel., 10804, 10820

DENNSTAEDTIACEAE

Dennstaedtia glabrata (Cesati) C. Chr., 10688, 11087

Dennstaedtia sp., 'novoguineensis group', 10533

Histiopteris estipulata v.A.v.R., 10698

Histiopteris integrifolia Copel., 10889

Histiopteris squamulata Holttum, 10483

Hypolepis hamleriana Rosenst., 10491

**Hypolepis scabristipes* Brownsey, 10778

Microlepis sp., 10646

Paesia radula (Baker) C. Chr., 10574

DIPTERIDACEAE

Dipteris conjungata Reinw., 10617, 10803

GLEICHENIACEAE

Dicranopteris linearis (Burm.) Underw., SR from Camp 1

Gleichenia brassii C. Chr., 10611

Gleichenia dicarpa R. Br., 10616

GRAMMITIDACEAE

Calymmodon clavifer (Hook.) Copel., 10557

Ctenopteris sp., 'curtisi-ctenoideum group', 10575

Ctenopteris flagelliforme Brause, 10548

Ctenopteris cf. longiceps (Rosenst.) Copel., 10594B, 10946

Ctenopteris millefolia (Blume) Copel., 10578

Ctenopteris repandula Kunze, 11053

Ctenopteris stellatosetosa Copel., 10668

Ctenopteris (close to) *stellatosetosa* Copel., 11070

Ctenopteris subsecundulobata (Zoll.) Copel., 10549, 10699

Grammitis dolichosora (Copel.) Copel., 10594A, 10664

Grammitis cf. dolichosora (Copel.) Copel., 10915

Grammitis interrupta (Baker) Copel., 10607

Grammitis scabristipes (Baker) Copel., 10594D

Grammitis sumatrana (Baker) Copel., 10546, 10594C

- Scleroglossum junceifolium* Copel., 10627
Scleroglossum pusillum (Blume) v.A.v.R., 10390

HYMENOPHYLLACEAE

- Hymenophyllum* sensu lato:
Mecodium sp., 'badium-hamlerianum group', 10679
Mecodium aff. *productum* (Kunze) Copel., 10839
Meringium cf. *gorgoneum* (Copel.) Copel., 10621
 cf. *Meringium* sp., 10550; sterile collection
Trichomanes sensu lato:
Cephalomanes oblongifolium Presl, 10916
Macroglena meifolia Copel., 10739
Macroglena schlechteri (Brause) Copel., 10651
 cf. *Macroglena* sp., 10721
Nesopteris cf. *intermedia* (v.d.B.) Copel., 10969,
 11004
Ptenomanes pallidum (Blume) Presl, 10628

Lindsaea group

- Lindsaea obtusa* J. Smith, 10691, 10844
Lindsaea obtusa J. Smith, 10705; pinnate form
Lindsaea pulchella (J. Smith) Mett. ex Kuhn,
 10838, 10932
Lindsaea pulchella (J. Smith) Mett. ex Kuhn
 var. *blanda* (Mett. ex Kuhn) Kramer, 10525
Lindsaea rigida J. Smith, 10696
Sphenomeris chinensis (L.) Maxon, SR from Camps
 3 & 4
Sphenomeris retusa (Cav.) Maxon, SR from Camps
 1, 3, & 4
Tapenidium sp., 10565

LOMARIOPSIDACEAE

- Bolbitis heteroclita* (Presl) Ching, 11021
Bolbitis rivularis (Brackenridge) Ching, 10995,
 11007
Bolbitis rivularis (Brackenridge) Ching, 11011;
 large form
Elaphoglossum novoguineense Rosenst., 10590
Lomagramma striata C. Chr., 10998

LYCOPODIACEAE

- Huperzia nummularifolia* (Blume) Jermy, 10771
Huperzia phlegmaria (L.) Rothm., 11059
Huperzia aff. *pinifolia* Trevisan, 10877
Huperzia squarrosa (Forst. f.) Trevisan, 10935
Lycopodium volubile Forst. f., 10397
Palhinbaca cernua (L.) Vasc. & Franco, SR from
 Camps 1 & 3

MARATTIACEAE

- Angiopteris erecta* (Forst.) Hoffman, 10816
Marattia cf. *tufaensis* C. Chr., 10499, 10501

OLEANDRACEAE

- Neprolepis biserrata* (Swartz) Schott, 10786
Neprolepis hirsutula (Forst. f.) Presl, 11030

- Neprolepis lanterbachii* Christ, 10605
Neprolepis rosenstockii Brause, 10812
Neprolepis schlechteri Brause, 10670, 10769
Oleandra cuspidata Baker, 10634, 10758, 10775
Oleandra siboldii Grev., 10703
Oleandra wernerii Rosenst., 10814

OPHIOGLOSSACEAE

- Opbioglossum pendulum* L., 10534

POLYPODIACEAE

- Aglaomorpha dryarioides* (Hook.) Roos, SR from
 Camp 3
Aglaomorpha heraclea (Kunze) Copel., SR from
 Camp 3
Belvisia mucronata (Fée) Copel. var. *mucronata*,
 11017
Belvisia novoguineensis (Rosenst.) Copel., 10412,
 10467, 10694
Belvisia validinervis (Kunze) Copel.
 var. *longissima* (Holtum) Hovenkamp & Franken,
 10509
Colysis polysora (Brause) Copel., 10893
Drynaria rigidula (Swartz) Bedd., SR from Camps
 2 & 3
Goniophlebium demersum (Brause) Rödl-Linder,
 10503
Goniophlebium pseudocannatum (Copel.) Copel.,
 10817
Goniophlebium serratifolium Brackenridge, 10432,
 10484, 10489
Lecanopteris depurarioides (Cesati) Baker, 10802.
 distr. as *L. curtisii* Baker
Lenmaphyllum accedens (Blume) Donk, 10783,
 10925, 11008, 11010
Loxogramme paltonioides Presl, 10487
Microsorium papuanum (Baker) Parris, 10477, =
Phymatosorus sp.
Microsorium sp., 10987, 11012
Phymatosorus commutatus (Blume) Pichi Sermolli,
 10801
Selliguea albidoghamata (Blume) Parris, 10505,
 10782, 10871, sn, distr. as *Crypsinus* spp.
Selliguea enervis (Cav.) Ching, 10528, 10759;
 'subgramineous,' distr. as *Crypsinus subundulatus*
Selliguea belluzgii (Diels) Hovenkamp, 10449,
 10558, 10931, distr. as *Crypsinus senescens*
Selliguea lanterbachii (Brause) Hovenkamp, 10439,
 distr. as *S. cf. gibbsiae*
Selliguea plantaginea Brackenridge, 10492; distr.
 as *Selliguea* sp.

PTERIDACEAE

- Pteris blumeana* Agardh, 10764
Pteris wallichiana Agardh, 10493
Pteris warburgii Christ, 10988

SCHIZAEACEAE

- Schizaea dichotoma* (L.) J. Smith, 11057
Schizaea fistulosa Labill., 10700

SELAGINELLACEAE

- Selaginella* sp., 'angustiramea-bieronymiana group',
 10517, 10930

Tectaria group

- Pteridrys* cf. *microblecia* (Fée) C. Chr. & Ching,
 10980
Tectaria cf. *christovalensis* (C. Chr.) Alston, 11014
Tectaria decurrens (Presl) Copel., 10997

THELYPTERIDACEAE

- Coryphopteris fasciculata* (Fourn.) Holttum, 10620
Plomuncuron marattioides (Alston) Holttum, 10547
Pneumatopteris sogerensis (Gepp) Holttum, 10810
Pneumatopteris sp., 'superba-subappendiculata group',
 10490, 10545
Pronophrum beccarianum (Cesati) Holttum,
 10645B
Pronophrum pentaphyllum (Rosenst.) Holttum,
 10736
Pronophrum cf. *scopularum* Holttum, or aff.,
 10645A, 10780, 10880
Pseudopogonopteris aurita (Hook.) Ching, 10485
Sphaerostephanos archboldii (C. Chr.) Holttum,
 10416
Sphaerostephanos cf. *arfakianus* (Baker) Holttum,
 10993
Sphaerostephanos dimorphus (Brause) Holttum,
 10788
Sphaerostephanos novoguineensis (Brause) Holttum,
 10909
Sphaerostephanos unicus (L.) Holttum var. *papilliferum*
 Holttum, 10784
Sphaerostephanos cf. *vetchii* Holttum, 10808, 10911
 **Sphaerostephanos* sp. 'nov.', 10707, 10733
 cf. *Sphaerostephanos* sp., 10809

VITTARIACEAE

- Antrophyum plantagineum* (Cav.) Kaulfuss, 10542
Antrophyum reticulatum (Forst.) Kaulfuss; s.l.,
 10898
Vittaria elongata Swartz var. *angustifolia* Holttum,
 10953

GYMNOSPERMS

GNETACEAE

- Gnetum gnemon* L., 10805

PODOCARPACEAE

- Dacrydium* cf. *imbricatus* (Blume) de Laub., 10899;
 sterile specimen
Podocarpus sp. A, 'ledermanni-neriiformis leaf type',
 10952; sterile collection
Podocarpus sp. B, 10585; sterile collection

MONOCOTS

AGAVACEAE

- Cordyline terminalis* Kunth, SR from Camp 3

ARACEAE

- Alocasia aequiloba* N.E. Br., 11001
Alocasia nicolsonii A. Hay, 10497
Amydrium zippelianum (Schott) Nicolsen, SR from
 Camp 4
Colocasia esculenta (L.) Schott, 10807
Cytosperma macrotum Becc. ex Engl., 11075
Epipremnum amplissimum (Schott) Engl., SR from
 Camp 4
Epipremnum pinnatum (L.) Engl., SR
Holochlamys beccarii Engl., 10999
Homalomena sp. A, 10642, small short-stem herb
Homalomena sp. B, 11110, robust cordate-leaf herb
Pothos sp., § *Pothos*, 11063, sterile collection
Rhaphidophora sp., 10865, Stone's architecture

ARECACEAE/PALMAE

- Calamus* cf. *reticulatus* Becc., 10569
Caryota rumbiana Blume, SR from Camp 3
Heterospathe sp. A, 10766
Heterospathe sp. B, 10676, 10954
Hydrastele sp., 11077
Korthalsia cf. *zippelii* Blume, 11061
Lamospadix sp., 10712; not *L. albertiana*
Orania cf. *oreophila* Essig, 10875

COMMELINACEAE

- Commelina diffusa* Burm. f., 10789
Flacopa scandens Lour., 10873
Forrestia mollissima (Blume) Kds., 10989; as
Anisebotolype f. *marginata* (Blume) Backer
Pollia thyrsoiflora (Blume) Steud., 11076

COSTACEAE

- Tapinochilus bollringii* K. Schum., 10985; det.
 O. Gideon

CYPERACEAE

- Carex alopecuroides* D. Don var. *chlorostachys* (D.
 Don) Clarke, 10455
Carex graeffeana Boeckl., 10714
Carex lamproclamyx S.T. Blake, 10564
Cyperus cyperinus (Retz.) Walck. Sur., 11086
Cyperus distans L. f., 10795
Cyperus kyllingia Endl., 10770, 10774
Eleocharis attenuata (Franch. & Sav.) Palla, 10629
Eriobrystis dichotoma (L.) Vahl, 10835
Hypoletrum compactum Nees & Mey., 10933
Hypoletrum nemorum (Vahl) Spreng., 10900, 10912
Parampania parvibractea (Clarke) Utrien, 10928
Scleria scrobiculata Nees & Mey., 10842

DIOSCOREACEAE

- Dioscorea bulbifera* L., 11035

FLAGELLARIACEAE

Flagellaria indica L., SR from Camp 3

HELICONIACEAE

Heliconia papuana W.J. Kress, 11045

JUNCACEAE

Juncus prismatocarpus R. Br. var. *indicus*, 10403

LILIACEAE

Dianella ensifolia L., 10419

MARANTACEAE

Phrynium cf. *macrocephalum* K. Schum., 11047

Phrynium sp., 10882

MUSACEAE

Musa sp., 11046

ORCHIDACEAE (dets. by N.H.S. Howcroft)

Aglossorhyncha sp., 10641

Bulbophyllum sp., § *Bulbophreatia*, 10384

Bulbophyllum sp., § *Coelochilus*, 10460

Bulbophyllum sp., § *Dialeipantbe*, 10921

**Bulbophyllum* sp. nov., 10724

Bulbophyllum sp., 10462, 10734, 10949, 11091

Bulbophyllum or *Mediocalcar* sp., 10461

Cadetia aprina (J.J. Sm.) Schltr., 10387

Ceratostylis sp., 10755

Chtonochilus papuanum Schltr., 10936

Coelogyne beccarii Rchb. f., 10861

Coelogyne cf. *veitchii* Rolfe, 10864

Dendrobium catbertsonii F.v.M., 10386

Dendrobium laueisii F.v.M., 10950

Dendrobium cf. *masarangense* Schltr., 10647

Dendrobium otaguroanum A.D. Hawkes, 10640

Dendrobium aff. *vexillarium* J.J. Sm., 10459

Dendrobium sp., § *Calyptrochilus*, 10586

Dendrobium sp., § *Eriopexis*, 10753

**Dendrobium* sp., § *Grastidium*, 10856; possible sp. nov.

Epiblastus sp., 10472

Eria aff. *ramuana* or *javanica*, 10633

Erythrodes sp., or *Eurycentrum*, 10732; spur present

Glomera cf. *aurea* Schltr., 10639

Glomera sp., 10417, 10579, 10633

Glossorhyncha sp., 10682

Goodyera sp., 10388

Liparis subg. *Menoneuron*, cf. § *Platybilis*, 10833

Liparis or *Malaxis* sp., 10923

Mediocalcar sp., 10391

Mediocalcar sp., 10610

Mischobulbum lancilabium Schltr., 10939

Oberonia sp., 10836

Pedilochilus sp., 10669

Pbreattia cf. *petiolata* Schltr., 10650

Pbreattia sp., § *Bulbophreatia*, 10392

Pbreattia sp., 10693

Platanthera papuana Schltr., 10692

Podochilus sp., 10527

Pseudaria cf. *pauciflora* Schltr., 11052

Spathoglottis plicata Krzl., 10866, 11024

Zeuxine sp., § *Hetaeropsis*, 10560

PANDANACEAE

Freycinetia cf. *angustissima* Ridley, 10725

Freycinetia sp. A, 10881

Freycinetia sp. B, s.n., Oct. 23, 1995

Pandanus sp., 'adnobotrys-setistylus group', 10767

Pandanus sp., § *Intraobtusus*, 10623

Pandanus sp., 11071

PHILESIACEAE

Gettonoplesium cymosum A. Cunn., 10592B

POACEAE/GRAMINEAE

Bambusa cf. *forbesii* (Ridley) Holttum, 10962

Isachne albens Trin., 10476

Isachne albomarginata Jansen, 10448

Isachne myosotis Nees, 10684

Isachne pauciflora Hack., 10938

Lophatherum gracile Brongn., 10847

Pennisetum macrostachyum (Brongn.) Trin., 10798

Saccharum officinarum L., 10800

Setaria palmifolia (Koenig) Stapf, 10465

SMILACACEAE

Smilax cf. *zeylanica* L., 11034

ZINGIBERACEAE

Alpinia odontonema K. Schum., 10683

Alpinia werneri Valeton, 10869

Alpinia sp., § *Dieramalpinia*, 10964

**Alpinia* sp., aff. *odontonema*, § *Pycnanthemum*, 10595

Etilingera angustifolia (Valeton) R.M. Smith, 10538

Etilingera sp., 10878; *Geanthus* (*Polyanthus*)

Pleuranthodium sp., § *Psychanthus*, 10849, 10959

Riedelia geluensis (Laut.) Valeton, 10597

Riedelia monticola Valeton, 10619, 10727

Riedelia rosacea van Royen, or aff. *monticola*, 10708, 10757

Riedelia subulocalyx Valeton, 10723

DICOTS

ACANTHACEAE

Hemigraphis aff. *primulifolia* (Nees) E. Vill., 11015

Leptosiphonium sp., 10870

Ptyssiglottis sp., 11006

Rungia klossii S. Moore, 10524

ACTINIDIACEAE

Saurauia cf. *capitulata* A.C. Smith, or aff., 10596

Saurauia aff. *conferta* Warburg, 10815, 11036

Saurauia congestiflora A.C. Smith, 10826

Saurauia ilicifolia van Royen, 10424

Saurauia cf. *nammanni* Diels, or aff., 10539, 10904, 11043

Saurauia schumanniana Diels, 10940

Saurauia sp. A; ?sp. nov., 10447, 10570; no match at LAE

Saurauia sp. B, 10829; subglabrous

AMARANTHACEAE

Tresine herbstii Hook. f., 10796

ANACARDIACEAE

Campnosperma brevipetiolata Volk, SR from Camp 4

ANNONACEAE

Haplostichanthus longinervis (Scheffler) van Heusden, 11088

genus indet., 10667

APIACEAE

Hydrocotyle strobilipoides Lamk, 10473, 10520

APOCYNACEAE

Alyxia markgrafti Tsiang, 11099

Parosmia cf. *sanguinea* (Wernham) Markgr., 11093

Parosmia sanguinea (Markgr.) Markgr. var. *brassii* (Markgr.) D.J. Middleton, 10735

Parosmia warensis Kanehira & Hatusima, 10906

Parosmia sp., 10860

Tabernaemontana pandacaku Lam., 10967

AQUIFOLIACEAE

Ilex scabridula Merrill & Perry, 10841

Ilex spicata Blume, 10583

ARALIACEAE

Gastonia spectabilis (Harms) Philipson, 10956

Harmsiapanax ingens Philipson ssp. *ingens*, 10514

Mackinlaya celebica (Harms) Philipson, 10674

Mackinlaya schlechteri (Harms) Philipson, 10710

Osmoxylon novoguineense (Scheff.) Becc., 10968

**Polyscias belesis* Philipson, 10580

Schefflera schumanniana Harms ssp. *schumanniana*, 10643, 10744

**Schefflera* ?sp. nov., aff. *sparsidentata* Frodin, 10427, 10471

Schefflera cf. *straminea* Frodin, 10498

Schefflera cf. *versteegii* Harms, 11109; also possibly *S. forbesii*

ARISTOLOCHIACEAE

Aristolochia sp., 10920; sterile collection

ASCLEPIADACEAE

Hoya sp., 10922

Tylophora cissoides Blume, 11025

ASTERACEAE/COMPOSITAE

Adenostemma lavenia (L.) O. Ktze., 10404, 10480

Ageratum conyzoides L., 10429

Arrhenachthites novoguineensis (S. Moore) Mattf., 10482B ssp. *novoguineensis*

Bidens pilosa L. var. *minor* (Blume) Sherff, 10458

Blumea arfakiana Martelli, 10884

Blumea arnakidophora Mattf., 10536

Blumea sylvatica (Blume) DC., 10562

Blumea sylvatica (Blume) DC. var. *macrophylla* (Blume) Randeria, 10434, 10531

Blumea sylvatica (Blume) DC. var. *sylvatica*, 10454

Crasosopalam crepidoides (Benth.) S. Moore, 10799

Erechtites valerianifolia (Wolf) DC., 10797

Mikania cordata (Burm. f.) B.L. Rob., 10879

Olearia platyphylla Mattf. var. *cinerea* (Mattf.) Koster, 10413

Olearia rufa Koster, 10598

Vernonia canata Less., 10831

BALSAMINACEAE

Impatiens hawkeri Bull, 10381, 10428, 10872

BEGONIACEAE

Begonia cf. *angustae* Irmscher, 10992

Begonia sp., 'kanensis group', 10441; climber, det. O. Gideon

Begonia tafaensis Merrill & Perry, or aff., 10502, 10890

BIGNONIACEAE

Tacoumbe dendrophila (Blume) K. Schum. & Laut., 10704

BORAGINACEAE

Tournefortia sarmentosa Lamk, SR from Camp 4

BURSERACEAE

Haplolobus cf. *floribundus* (K. Schum.) H.J. Lam, 11092; 'floribundus-versteegii'

CAMPANULACEAE

Peracarpa carnosa (Wallich) Hooker & Thompson, 10544

CARDIOPTERIDACEAE

Cardipteris woluccana Blume, 10793

CARYOPHYLLACEAE

Drymaria cordata (L.) Willd. ex Roem. & Schult., SR from Camp 3

CASUARINACEAE

Gymnostoma papuana (S. Moore) L. Johnson, 10855

CELASTRACEAE

Celastrus monospermoides Loes., 10851

CHLORANTHACEAE

Ascarina philippinensis C.B. Rob., 10613

Ascarina subsessilis Verdc., 10760

CLUSIACEAE/GUTTIFERAE

Garcinia archboldiana A.C. Smith, 10494

**Garcinia* sp. nov., 11098; det. P.F. Stevens

Garcinia sp., 10951

CRYPTERONIACEAE

Crypteronia cunningii (Planch.) Planch. ex Encll., 11104

CUCURBITACEAE

- Trichosanthes* sp., 10927A; sterile collection
Zehneria cissymbium (Jacobs) Jeffrey, 10737
Zehneria cf. *cissymbium* (Jacobs) Jeffrey, 10518

CUNONIACEAE

- Acsmithia reticulata* (Schltr.) Hoogland, 10603
Calcluvia rufa (Schltr.) Hoogland, 10673
Ceratopetalum succrubrum C.T. White, 10853

DAPHNIPHYLLACEAE

- Daphniphyllum gracile* Gage var. *gracile*, 10584

DILLENIACEAE

- Dillenia* cf. *schlechteri* Diels or cf. *quercifolia* White & Francis, 10495

ELAEOCARPACEAE

- Aceratium parvifolium* Schltr., 10806
Elaeocarpus tariensis Weibel, 10422, 10591
Sloanea brachystyla (Schltr.) A.C. Smith, 10747
Sloanea velutina (Schltr.) A.C. Smith, 10553

ELEAGNACEAE

- Elaeagnus triflora* Roxb. cf. var. *brevilimbata* T Hart, 10811, 10874

ERICACEAE

- Dimorphanthera cornuta* J.J. Sm. var. *tenuiflora* Sleumer, 10395
Dimorphanthera aff. *cornuta* J.J. Sm., 10743; det. P.F. Stevens
Dimorphanthera elegantissima K. Schum. var. *splendens* (Sleumer) P.F. Stevens, 10632 (fl); det. P.F. Stevens
Dimorphanthera elegantissima K. Schum. var. *splendens* (Sleumer) P.F. Stevens, 11108 (fr)
Diplycosia edulis Schltr., 10908
Diplycosia morobeensis Sleumer, 10658
 **Rhododendron anagalliflorum* Sleumer, 10389, 10686
Rhododendron beyerinckianum Koord., 10685
Rhododendron aff. *beyerinckianum* Koord., 10396; not the species
Rhododendron englerianum Sleumer, or aff., 10863
Rhododendron cf. *macgregoriae* F.v.M. var. *glabrifilum* (J.J. Sm.) Sleumer, 11073
Rhododendron superbum Sleumer, 10859
Rhododendron wrightianum Koord. var. *insulare* Sleumer, 10656
Vaccinium reticulato-venosum Sleumer, 10887
Vaccinium sp., § *Orianthe*; aff. *villuiflorum* J.J. Sm., 10907

EUPHORBACEAE

- **Antidesma* aff. *cbalaranthum* Airy Shaw, 10716
 **Antidesma katikii* Airy Shaw, 11054, 11079
Aporosa sp., 'brevicaudata-squarrosa group', 10701 (f), 10722 (m)

- Aporosa laxiflora* Pax & Hoffman, 10582
Breynia cernua (Poir.) Muell. Arg., 10529
Bridelia penangiana Hook. f. cf. var. *penangiana*, 11020

- Claoxylon coriaceo-lanatum* Airy Shaw, 10519
Endospermum labios Schodde, 11048
Euphorbia plumerioides Teijsm. ex Hassk. var. *acuminata* J.J. Sm., 10792
 **Glacbidion* sp. nov., 10543
Macaranga aleritoides F. Muell., SR from Camp 4
Macaranga bifoveata J.J. Sm., 10972
Macaranga caudata Pax & Hoffman, 10414, 10470
 **Macaranga reuteriana* Pax & Hoffman, 10496, 10508
 **Mallotus papuanus* (J.J. Sm.) Pax & Hoffman, or aff., 10947
Omalanthus novo-guineensis (Warburg) K. Schum., 10407, 10957

FAGACEAE

- Castanopsis acuminatissima* (Blume) A. DC., 11082
Litbocarpus cf. *celebicus* (Miq.) Rehd., 10785

FLACOURTIACEAE

- Flacourtia zippelii* Slooten, 11039
Pangium edule Reinw., SR from Camp 4

GESNERIACEAE

- Aeschynanthus* sp. A, 10442
Aeschynanthus sp. B, 10630
Aeschynanthus sp. C, 10678
Cyrtandra fusco-vellea K. Schum., 11009
Cyrtandra aff. *janowskyi* Schltr., 10897, 11078
Cyrtandra sp., subgenus *Cyrtandra*, 10443, 10741
Cyrtandra sp., subgenus *Cyrtandra*, 10510
Cyrtandra sp., § *Diplochiton*, 10469, 10715
Cyrtandra sp., cf. § *Diplochiton*, 10506, 10599
Cyrtandra sp., cf. § *Diplochiton* or § *Loxolobus*, 10440
Cyrtandra sp., § *Geodesme*, 10383, 10452, 10681
Cyrtandra sp., § *Loxophyllum*/*Phaetrichium*, 10577, 10637, 10840
Cyrtandra sp., cf. § *Loxophyllum*/*Phaetrichium*, 10734
Cyrtandra sp., § *Macrocycrtandra*, 10631
Cyrtandra sp., 10709; possibly = sp. 10443
Dicbotrichum sp., 10636, 10883
Rhynchoglossum obliquum Blume, 10986

GOODENIACEAE

- Scaevola oppositifolia* R. Br., 10832

GROSSULARIACEAE

- Polyosma* aff. *subalpina* Schultz-Menz, 10555, 10677

HALORAGACEAE

- Gonocarpus balconensis* (Merrill) Orchard, 10600

Gunnera macrophylla Blume, 10420

HYDRANGEACEAE

Dicobra febrifuga Lour., 10426; 'sylvestica complex'

LAMIACEAE/LABIATAE

**Basilicum* sp., 10626, 10972

Orthosiphon aristatus (Blume) Miq., 10966

Plectranthus parviflorus Willd., 10581

LAURACEAE

Actinodaphne nitida Teschner, 11105

Actinodaphne tomentosa Teschner, 10752

Cinnamomum clemensii Allen, 10649

Cinnamomum cf. *podagricon* Kostermans, 10845

Cryptocarya aff. *fuscopilosa* Teschner, 10516

Cryptocarya notyfaetorum Kostermans, 10652, 10680, 10728

Litsaea carrii Kostermans, 10444

LEEACEAE

Leea indica (Burm. f.) Merrill, 10825, 11040

LEGUMINOSAE/FABACEAE

Derris cuneifolia sensu Verdc., 11031

Desmodium repandum (Vahl) DC., 10457

Desmodium sequax Wall., 10895, 11023

Inocarpus 'rubidus' morphotype', *papuans* group, 11083; sensu Verdcourt

Micuna novo-guineensis Schell., SR from Camp 4

Pueraria puberula (Koord.) Koord.-Schumacher, 11029

LOGANIACEAE

Fagraea cf. *ceilanica* Thunb., 10729

Fagraea elliptica Roxb., 11106

Geniostoma aff. 'enpestre complex', 10644

LORANTHACEAE

Amyema squarrosus (Krause) Danser ssp. *squarrosus*, 10468

Macrosalen cochinchinensis (Lour.) Tiegh. var. *cochinchinensis*, 10854

MAGNOLIACEAE

Elmerrillia tsiampana (L.) Dandy ssp. *tsiampana*, 10738

MELASTOMATACEAE

Astronia atro-viridis Mansfeld, 10437, 10612

**Astronidium* cf. *novoguineense* Merrill & Perry, 10762

Astronia indet., 10523; probably *Astronia* sp. *Beccarianthus* sp., 10902

Creschiton novoguineensis (Baker f.) Veldkamp & Nayar, 11094

Dissochaeta angiensis Ohwi, 10790

Medinilla albida Merrill & Perry, 10654

Medinilla aff. *albida* Merrill & Perry, 10556; but leaves sessile

Medinilla dentata Veldkamp, 10666

Medinilla bollrungiana Mansfeld, 10852

Medinilla aff. 'lorentziana-teysmannii group', 10862; closer to *lorentziana*

Medinilla sogierevnsis Baker f., or aff., 10406

Medinilla teysmannii Miq., 10977

**Medinilla* sp. nov., 10408

Melastoma malabatricum L., 10398

Otanthera adpressa Mansfeld, 10888

Poikilogyne furfuracea Markgr., 10400

Poikilogyne macrophylla (Cogn.) Mansfeld, 11095

MELIACEAE

Aglala cf. *silvestris* (M. Roemer) Merrill, 10665; but leaflets symmetric

Aglala aff. 'tomentosa group', 10813; but inflo. pendant, ?new

Cbisobeton lasiocarpus (Miq.) Valetton, 11000; *formicarium-pachyrbachis*

Dysoxylum eucanthophyllum Harms, 10438, 10751

MONIMIACEAE

Kibara karengana Philipson, 10554

Levieria montana Becc., 11049

Palmeria arfakiana Becc., 10401

Palmeria gracilis Perkins, 10876

Stegantbera hospitans (Becc.) Kanchira & Hatusima, 11041

Stegantbera ilicifolia A.C. Smith, 10593, 10749

**Stegantbera insculpta* Perkins, 10513, 10672

MORACEAE

Ficus adelpha Laut. & K. Schum., 10903

Ficus arborea Laut. & K. Schum., 11038

Ficus comitis King, 11100

Ficus opposita Miq., 10726, 10730

Ficus pungens Reinw. ex Blume, SR from Camps 3 and 4

Strobilus urophyllum Diels, 10601

MYRISTICACEAE

Myristica pauciphylla A.C. Smith, 10660

Myristica subulidata Miq., 10787, 10929

Myristica velutina Markgr., 10711

MYRSINACEAE (dets. by J. Pipoly)

Ardisia forbesii S. Moore, or aff., 11060

Ardisia sp., 10718

Conandrium polyanthum (Laut. & K. Schum.) Mez, 10824

Fittingia sp., 10661, 10745

Maesa papuana Warburg, 10960; det. WT

Myrsine acrostica (Mez) Pipoly, 10857

**Myrsine* aff. *acrostica* (Mez) Pipoly, 10958; possible sp. nov.

Myrsine lancasteri (K. Schum.) Pipoly, 10573, 10671

MYRTACEAE

- Kania engenioides* Schltr., 10540, 10648
Metrosideros vaniflora Laut. var. *humilis* (Diels)
 Dawson, 10474
Rhodomyrtus novoguineensis Diels, 10568
Syzygium cf. *longipes* Merrill & Perry, 10914
Syzygium malaccense (L.) Merrill & Perry, s.
 lat., 10719
 **Syzygium* aff. *megistophyllum* Merrill & Perry,
 11068
Xanthomyrtus montivaga A.J. Scott, 10602

NEPENTHACEAE

- Nepenthes maxima* Nees, 10592, 10713

OCHNACEAE

- Schuermansia beuningsii* K. Schum., 10515;
 characteristic robust form
Schuermansia beuningsii K. Schum., 10409; di-
 minutive form

PIPERACEAE

- Peperomia* cf. *gurakorana* Dull, 11067
Peperomia pellucida (L.) Kunth, 10695
Piper bolanicum Chew, 10411
Piper caninum Blume, 11072
 **Piper lessertianum* (Miq.) C. DC., 10874B, 10927
Piper cf. *pseudoambianense* C. DC., or aff., 10975
Piper radatzii K. Schum. & Laut., 10541, 10702,
 10773, 11032
Piper subbullatum K. Schum. & Laut., 10822
Piper subcanivivum C. DC., 10486
Piper triangulare Chew, 10552

PITTOSPORACEAE

- Pittosporum pullifolium* Burk. ssp. *ledermannii*
 (Pritzl.) Schodde var. *ledermannii*, 10618
Pittosporum sinuata Blume var. *sinuata*, 11058
Pittosporum sinuata Blume var. *efuniculare* Steen.,
 10405, 10655, 10689

POLYGALACEAE

- Polygala paniculata* L., 10834

POLYGONACEAE

- Muehlenbeckia platyclada* (E. Muell.) Meisn., 10934
Polygonum chinense L., 10466

PROTEACEAE

- Helicia* cf. *forbesiana* Ev.M., 11103
Helicia microphylla Diels, 10609
Helicia obtusata Sleumer, 10638
Helicia oreadam Diels, or aff., 10917

RHAMNACEAE

- Alphitonia excelsa* (Fenzl) Reiss. ex Endl., SR from
 Camp 3
Ziziphus papuanus Laut., or *Z. djamuensis* Laut.,
 SR from Camp 4

ROSACEAE

- Prunus dolichobotry* (K. Schum. & Laut.) Kalkman,
 11037
Prunus pullei (Koehe) Kalkman, 10608
Prunus sclerophylla Kalkman, 10742
 **Prunus* sp. nov., 10588
Rubus archboldianus Merrill & Perry, 10451, 10563
Rubus moluccanus L. var. *moluccanus*, 11013
Rubus moluccanus L. var. *obtusangulus* Miq., 10453
Rubus trigonus Kalkman, 10463

RUBIACEAE

- Aivosperma ramuense* Laut. & K. Schum., 10905
Argostemma sp., 10385; not *A. bryophilum*
Dolicholobium oxyclobum K. Schum., 11042
Gardenia pallens Merrill & Perry, 10625
Heulotyis congesta R. Br., 10965
Heulotyis pubescens Valetton, 11080
Hydrophytum radicans Becc., 10943
Hydrophytum virgatum Valetton, 11069
Ixora dolichobotrysa Brem., 10945
Morinda umbellata L. var. *papuanus* Valetton, 10886
Mussaenda oreadam Wernham, 10867; det. O.
 Gideon
Mussaenda scratchleyi Wernham, 11097; conf.
 O. Gideon
Mycetia javanica (Blume) Reinw. ex Korth., 10978
Myrmecodia melanacantha Huxley & Jebb, 10720
Myrmecodia schlechteri Valetton, 10720B
Nertera granadense (Mutis ex L. f.) Druce, 10504
Ophiorrhiza aff. *?amoena* Valetton, 10991, 11019
Ophiorrhiza debryunii Valetton, 10382
Ophiorrhiza tenelliflora Valetton, 10926
Pavetta platyclada K. Schum., 10983
Psychotria amplithyrsa Valetton, 10791
Psychotria multicostata Valetton, 11065
Psychotria aff. 'nanifrutec group', 10662
Psychotria olivacea Valetton, 11102
Psychotria phaeochlamys (Laut. & K. Schum.)
 Valetton, 10982
Psychotria ramadecombens Sohmer, 10768
Psychotria valettoniana Sohmer, 10399, 10941
 **Psychotria* sp. nov., 11090
Tarenna barbellata Valetton, or aff., 10830
Timonius belense Merrill & Perry, 10587
Timonius aff. *xanthocarpos* Merrill & Perry, 10418
Uncaria bernaysii Ev.M., 10827
Urophyllum britannicum Wernham, or aff., 10756

RUTACEAE

- Acronychia ledermannii* Laut., 10717, 10750
Flindersia pimenteliana Ev.M., 10944
Melicope sp. A, 10606; small trifoliolate leaves,
 congested inflorescence
Melicope sp. B, 10615; subcaudate petiolate leaflets
Melicope sp. C, 10823; gestalt like *Melicope*

- mucronata*; leaflets villous, sessile, to 37 cm
× 20 cm
Melicope sp. D, 10892; glabrous obovate leaflets
- SABIACEAE**
Sabia pauciflora Blume, 11026
Meliosma pinnata (Roxb.) Maxim. ssp. *humilis*
(Merrill & Perry) Beus., 10488
Meliosma pinnata (Roxb.) Maxim. ssp. *macrophylla*
(Merrill) Beus., 11107
- SANTALACEAE**
Cladomyza cuneata Danser, 10436
- SAPINDACEAE**
Arytera aff. *multijuga* or *macrobotrys*, 10976
Cupaniopsis macropetala Radlk., 11089
Gutia comesperma Radlk., 11094A
Pometia pinnata Forst. & Forst. f., SR from Camps
3 and 4
Sarcopteryx crispata Welzen, 11101
- SAPOTACEAE**
Planchonella monticola (Krause) H.J. Lam, 10589;
presumably better as *Sideroxylon monticola*
Krause
- SOLANACEAE**
Solanum anfractum Symon, 10530; det. Symon
Solanum rostellatum Merrill & Perry, 10663; det.
Symon
- SPHENOSTEMONACEAE**
Sphenostemon papuanus (Laut.) Steen. & Erdtman,
10731
- STERCULIACEAE**
Sterculia ampla Baker f., 10963
Sterculia schumanniana (Laut.) Mildbr., 11085
Sterculia cf. *schumanniana* (Laut.) Mildbr., 11081
- SYMPLOCACEAE**
Symplocos cochinchinensis (Lour.) S. Moore, 10566
Symplocos cf. *cochinchinensis* (Lour.) S. Moore, 10415
Symplocos cochinchinensis (Lour.) S. Moore ssp.
leptophylla (Brand) Nooteb., 10614, 10746
Symplocos cochinchinensis (Lour.) S. Moore var.
schumanniana (Brand) Nooteb., 10748, 10843,
10961
cf. *Symplocos*; small leaves, ?uniflorous, 10507
- THEACEAE**
Eurya cf. *leptantha* Diels, 10394
Eurya sp., '*leptantha-merrilliana* group', 10657
Eurya rigand K. Schum. & Laut., 10421, 10571
Ternstroemia britteniana F.v.M., 10532, 10624
Ternstroemia cherryi (F.M. Bail.) Merrill, SR between
Camps 3 and 4
- THYMELAEACEAE**
Phaleria macrocarpa (Scheff.) Boerl., 10430
- TRIMENIACEAE**
Trimenia papuana Ridley, 10393, 10402
- ULMACEAE**
Parasponia rigida Merrill & Perry, 10567
Trema camabina Lour., 10918
- URTICACEAE**
Boehmeria platyphylla D. Don, s. lar., 11016
Boehmeria sp., 10522 (m); ?*Cypholophus*
Cypholophus nummularis H. Winkler, 11018
Debregeasia sp., 10464
Elatostema beccarii Schroeter, 10894
Elatostema aff. *belense* Perry, 10891, 10994
Elatostema blechnoides Ridley, 10450, 10478
Elatostema macrophyllum Brongn., 10979
Elatostema mongienae Laut., 10535
Elatostema morobense Perry, 10433
Elatostema noto-guineense Warburg, 10885, 10896,
11022
Elatostema trident Perry, 10475
Elatostema weinlandii K. Schum., 11096 (f)
Laportea ducumana (Roxb.) Wedd., 10974
Leucosyke capitellata (Poir.) Wedd., 11044
Pilea effusa H. Winkler, 10512
Pilea ledermannii H. Winkler, 10687
Pilea stenoneura H. Winkler, 10521, 10410
**Pilea* sp. nov., 10481, 10559, 10740
Pipturus argenteus (Forst. f.) Wedd., 10446 (m),
10500 (f), 10990 (f)
Pipturus pullei H. Winkler, or aff., 10511
Poikilospermum inaequale Chew, 10858 (f), 10984
(m)
Procris frutescens Blume, 10901
Procris sp., 10981
- VERBENACEAE**
Callicarpa longifolia H.J. Lam, 10973
Geunisia pentandra (Roxb.) Merrill, 10821
Stachytarpheta cayenensis (Rich.) Vahl, 11028
- VITACEAE**
Cayratia geniculata Blume, or aff., 11027
Coryratia japonica (Thunb.) Gagn., SR from Camp
4
Cissis aristata Blume, 10948
Cissis discolor Blume, SR from Camp 3
Tetrastigma lanterbachianum Gilg, 11033
- WINTERACEAE**
Zygogynum oligocarpum (Schlrr.) Vink, 11084
Zygogynum cf. *sylvestre* (A.C. Smith) Vink, 10850
- FAMILY INDET.**, 10425, 10431

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